EX PARTE OR LATE FILED

Sprint

Pete Sywenki
Director, Federal Regulatory Relations

Law & External Affairs
1850 M Street, NW, Suite 1100
Washington, DC 20036
Voice 202 828 7452
Fax 202 296 3469
pete.n.sywenki@mail.sprint.com

EX PARTE

April 21, 1998

Ms. Magalie Roman Salas
Secretary - Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, D.C. 20554

RE: CC Docket Nos. 96-45 and 97-160

Dear Ms. Salas,

On April 20, 1998, Jim Sichter, Brian Staihr, Jay Keithley, and Pete Sywenki of Sprint held separate meetings with Jim Casserly, Kyle Dixon, and Tom Powers with regard to the above referenced dockets. In each of these meetings, we discussed the status of the cost proxy model platforms currently under the FCC's consideration for use in determining universal service funding for high cost areas. The attached information was discussed in the meetings. These attached materials illustrate the methodology by which customer locations are converted into serving areas for use in the HAI model and point out the way in which this approach significantly understates required distribution facilities.

Included in these materials are estimated distances (lengths) between customer location points within specific clusters. The calculation of these distances was developed by Sprint staff during an on-site review of PNR geo-coded data at PNR Associates (the vendor used by HAI for customer location points and clustering). This review was arranged in response to Sprint's requests during recent Nevada PUC costing proceedings. The information provided during our meeting did not include any actual customer locations or any other information proprietary to PNR. During the meetings, we discussed the continued closed treatment of the HAI clustering information and the need for the Commission to require a full disclosure, to all interested parties, all of the data, algorithms, and other relevant data used by HAI to calculate distribution plant lengths and investment costs. Only a full review would provide for a quantification of the magnitude of the systematic understatement of required distribution facilities in the HAI model that is demonstrated in the attached findings which are based on only the limited review that has been afforded to date.

The original and three copies of this notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules. If there are any questions, please call.

Sincerely,

Pete Sywenki

Attachments

cc: J. Casserly
K. Dixon
T. Powers

The HAI model is fundamentally flawed

By order of the Nevada Public Service Commission, Sprint and other parties were given their first opportunity to review the data and algorithms underlying the HAI model calculation of distribution plan investment.

Upon review of this data, Sprint found that **the HAI model understates distribution plant investment by a factor of 9.**

-The distance between the HAI geocoded points in the Nevada "clusters" examined by Sprint was 9 times the amount of distribution plant "built" by the HAI model.

It is physically impossible to construct a network serving those customers with less plant than the distances between those customers.

This error in the HAI model is not a geocoding problem

-Even if every customer is geocoded, the HAI model will produce the same erroneous results

This error is not an input issue

-The error stems from a fundamental flaw in the way in which the HAI model calculates distribution plant distances. The HAI model would have to be completely rewritten to correct this problem.

What is the impact of this error in the HAI model?

Based on the limited sample of Nevada clusters that Sprint was able to examine, the actual distribution lengths and investment costs is at least 9 times what is calculated in the HAI model. Correcting this error will result in longer distribution plant loop lengths, higher costs, and a larger USF fund.

An indication of the magnitude of this error is provided below, using the conservative assumptions that:

-HAI understates distribution investment by a factors of 2 and 5—not the factor of 9 found by Sprint

-the error applies only to the two lowest density zones

National USF, HAI (FCC staff default inputs)

	USF at wire center level	USF at CBG level
HAI model	**$2.9b**	**$4.1b**
HAI model, distribution plant x2	**$4.7b**	**$6.6**
HAI model, distribution plant x5	**$10.1b**	**$14.4b**

In short, the HAI model understates USF funding requirements by at least 60% to 250%, and possibly more.

What should the Commission do?

The HAI model remains shrouded in secrecy, contrary to the Commission's own criterion #8 for cost proxy models:

"The cost study or model and all underlying data, formulae, computations, and software associated with the model should be available to all interested parties for review and comment. All underlying data should be verifiable, engineering assumptions reasonable, and outputs plausible".

Clearly, the outputs of the HAI model, which builds distribution plant almost an order of magnitude less than the bare minimum needed to connect customers, are not plausible.

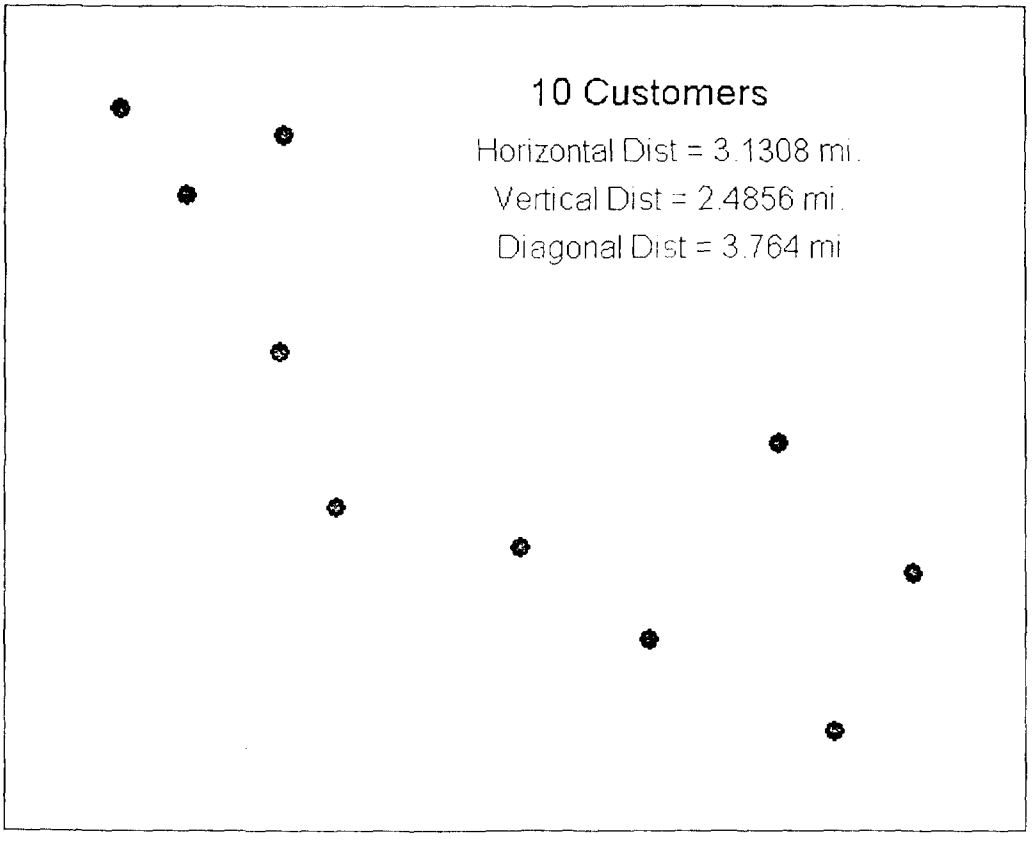
Sprint was able to discover this flaw in HAI only because the Nevada Commission required that heretofore "proprietary" components of the HAI model be made accessible to interested parties. Sprint can only estimate the magnitude of the problem, based on the limited data it has had an opportunity to review. Only a full review of the alleged "proprietary" data used in the HAI model can accurately quantify the magnitude of the error.

Therefore the Commission should immediately order AT&T and MCI to fully disclose, to all interested parties, all of the data, algorithms, and other relevant date used in the HAI model to calculate distribution plant lengths and investment costs.

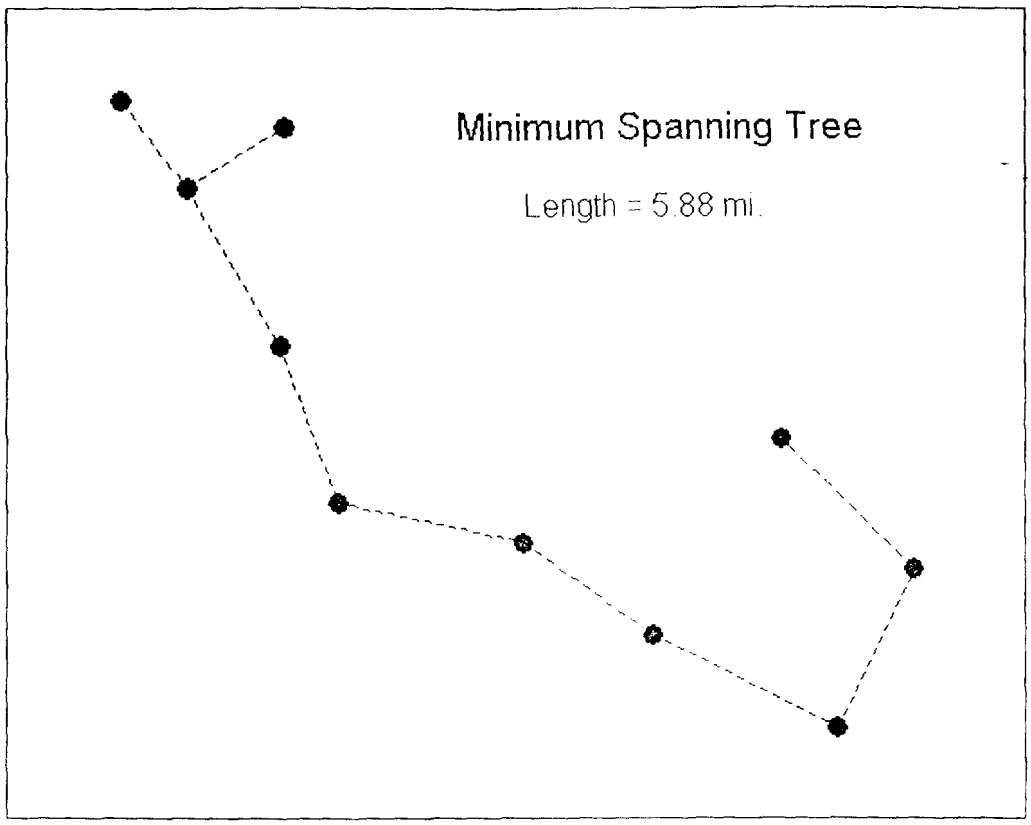
In the alternative, the Commission should summarily reject the HAI model as being inconsistent with the Commission's criterion #8 for cost proxy models.

Hatfield's Polygons Converted to Rectangles

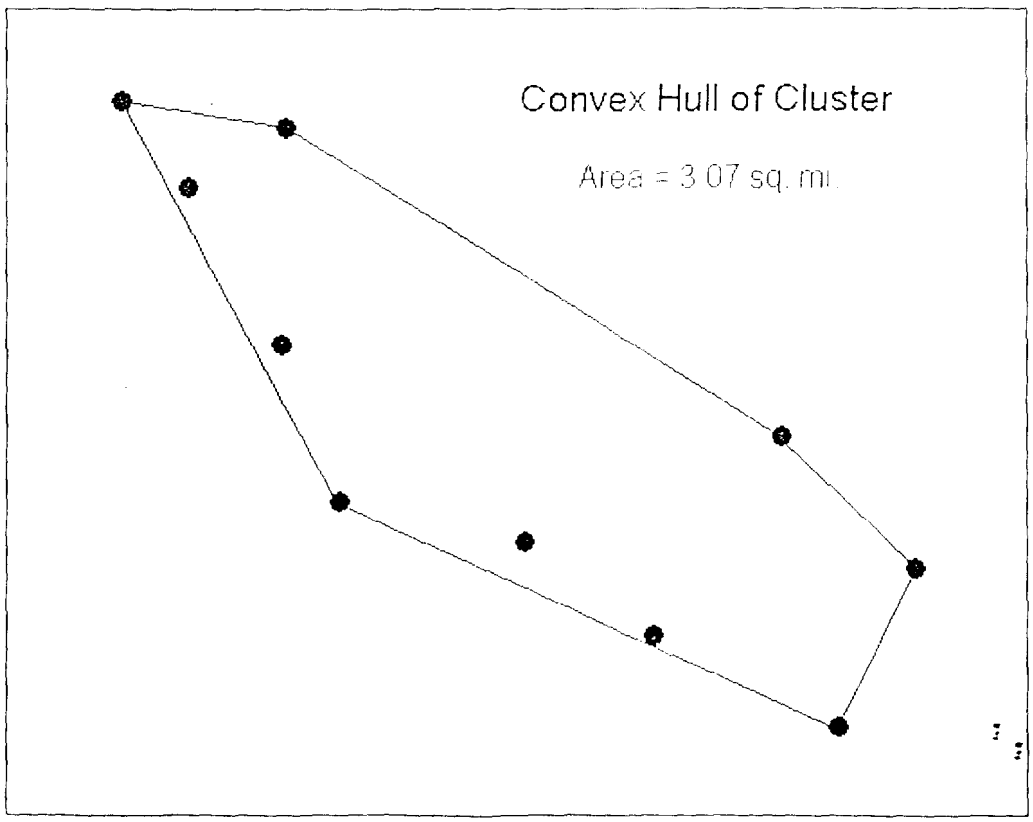
The Hatfield 5.0a Model groups a set of "actual" customer points into a *cluster*, according to a set of aggregation rules.



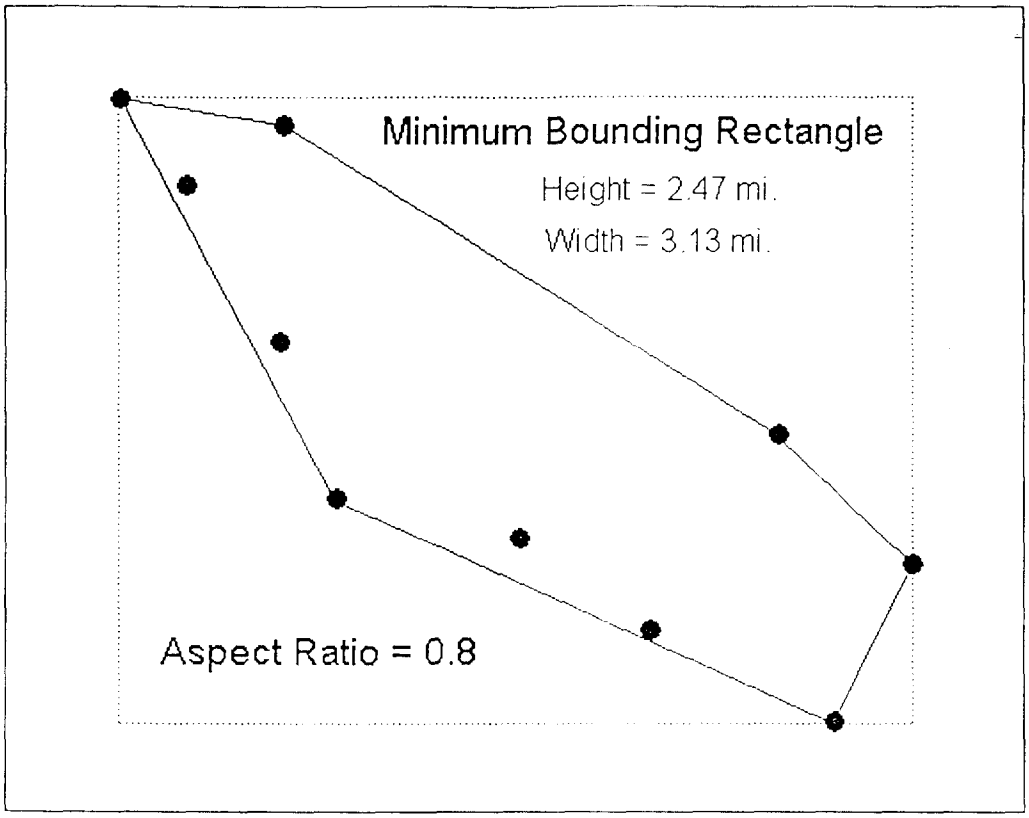
We have determined that the *minimum spanning tree* for these points – the mathematically shortest connection possible for these points – is 5.88 miles.



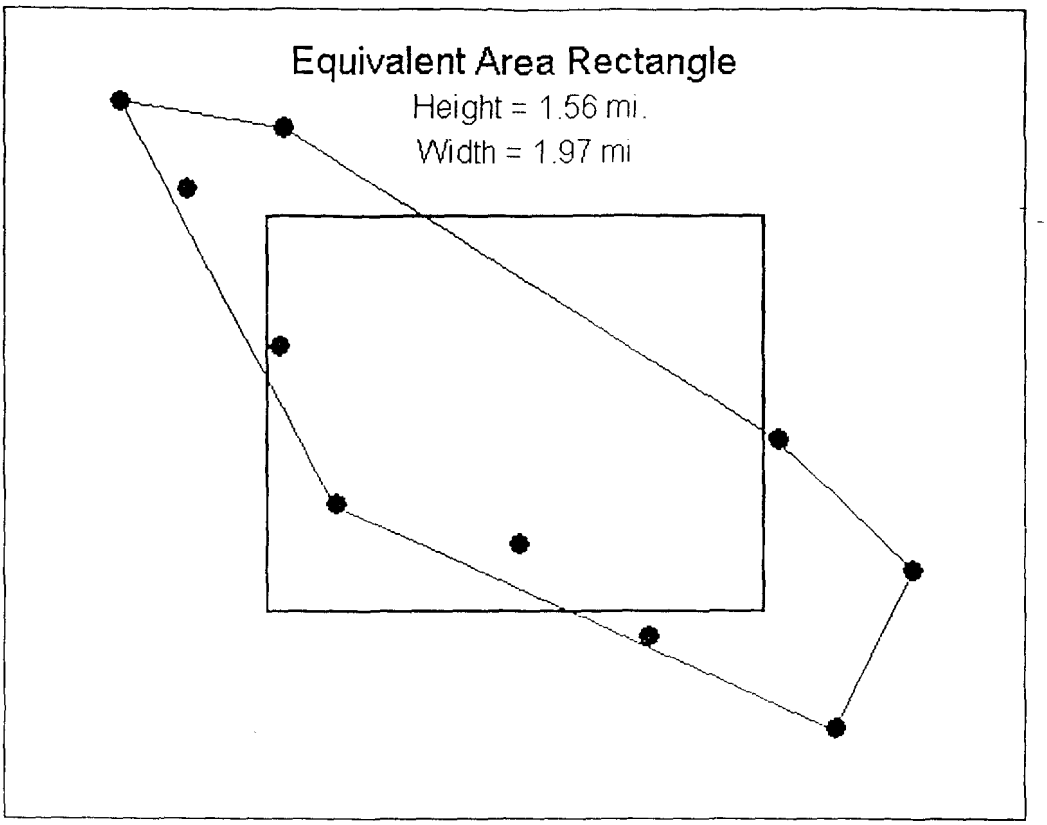
When Hatfield has determined the set of points that constitute a cluster, it logically draws a *convex hull* around those points, and determines its area.



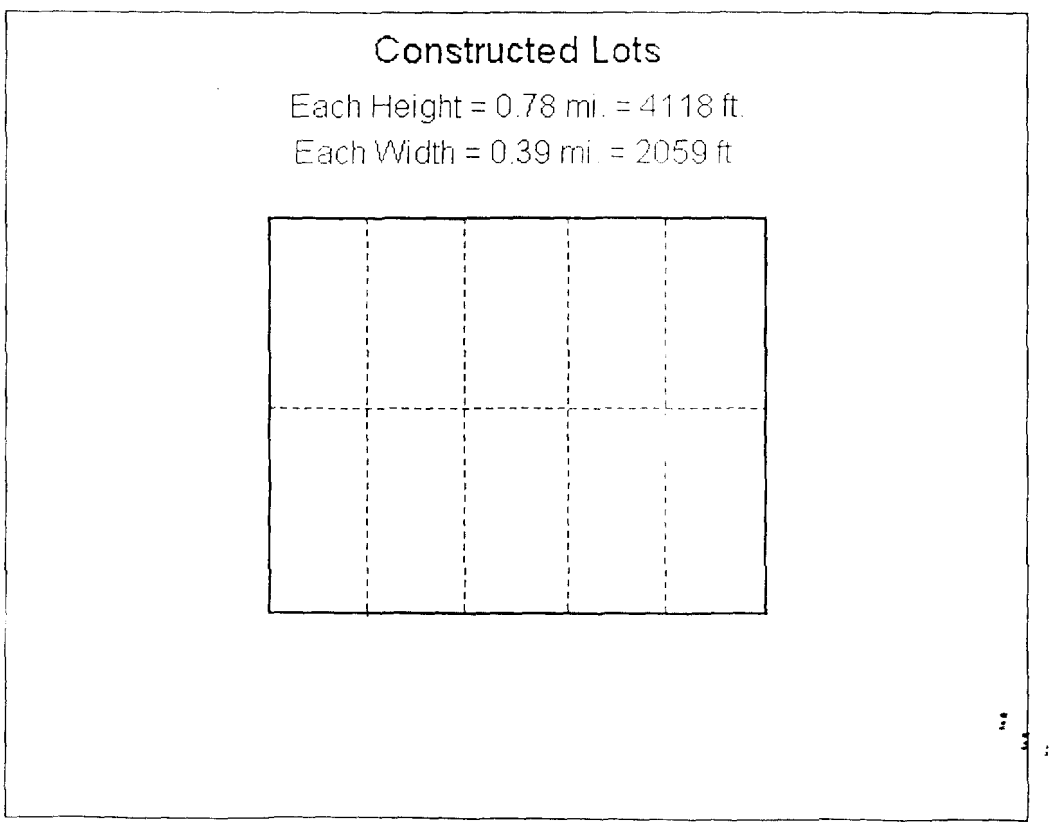
Hatfield then logically constructs a *minimum bounding rectangle* – oriented north-south-east-west – that exactly bounds the cluster's points. Hatfield then determines the *aspect ratio* of that rectangle (that is, the ratio of the rectangle's height to its width) ... in this case, 0.8.



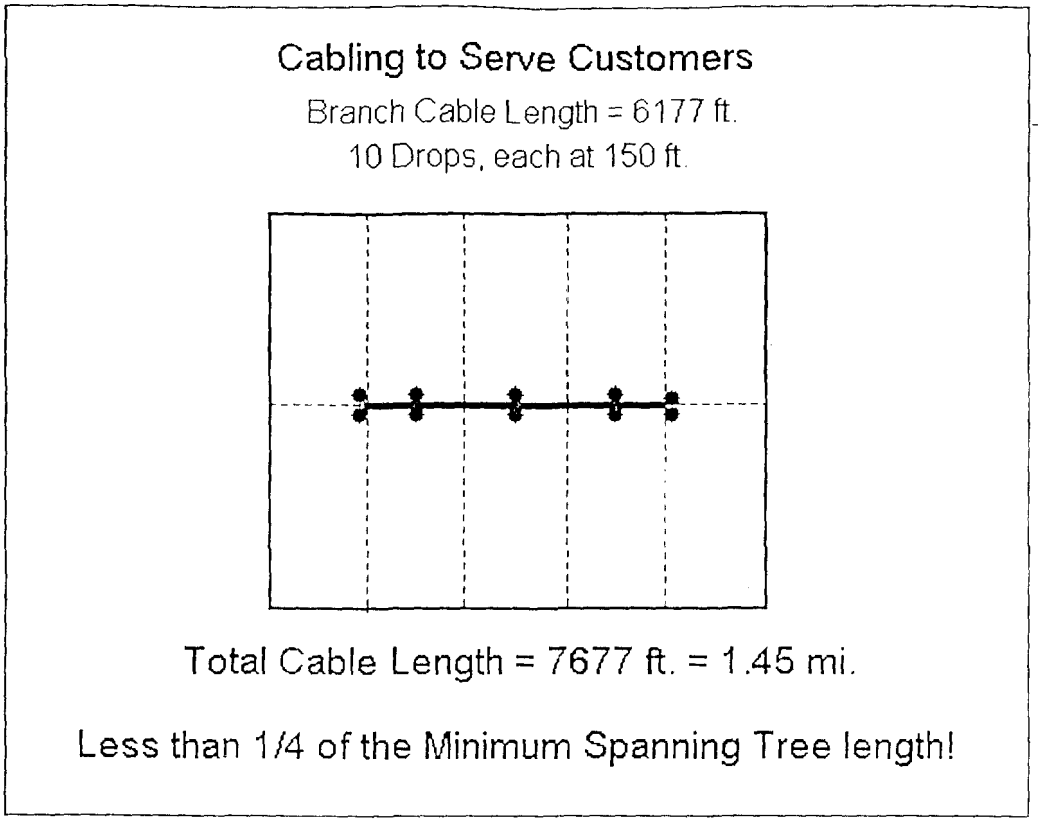
Hatfield then constructs a *rectangle* with the above aspect ratio; the *size* of that rectangle is determined, of course, by its *area* ... and that area is set to be the *area of the convex hull* ... in this case, 3.07 square miles.



Hatfield then constructs *lots* within this constructed rectangle. Each lot is twice as high as it is wide.



A *branch cable* is then constructed, and 150 ft. drops connect to the customers.



But note how closely the customers are squeezed toward the branch cable. The arrangement is unrealistic, both from the standpoint of cable length *and* from the standpoint of area served.

Customer Area Served

Height = 300 ft.

Width = 106 + 6177 + 106 ft. = 6389 ft.

Area Served = 1,916,700 sq. ft. = 0.0688 sq. mi.

But Actual Cluster Area = 3.07 sq. mi.

Area Modeled is 1/44 of Cluster Area

So, HOW BAD CAN THIS BE?

To what extent does the combined effect of:

1) converting the polygon into a rectangle (with identical area) and
2) building cable only to the point where the perimeter lots start
3) assuming all customers have drops 150 feet or less

cause the model to UNDERSTATE the amount of cable needed to transverse the ACTUAL distances between customers?

The following table shows a sample of several individual clusters (not wire centers) in Nevada (Nevada Bell territory).

The table gives an example of the amount of cable needed to reach all actual customer locations in the cluster. The locations do NOT include any outlier locations. The distance reported is only the distance between points that reside in the main clusters.

This length represents an approximation of the amount of distribution that the Hatfield Model (or any proxy model) should build in the course of laying out the network and determining the associated cost.

The table also shows the amount of actual distribution the Hatfield Model builds to each respective cluster (again, excluding outlier points).

Cluster Number	Absolute Minimum Distance Between Cluster Points (in feet)	Total Amount of Distribution Cable Built by Hatfield Model (in feet)
CHBTNV11.C003	23,500	7,900
IMLYNV12.C022	29,000	2,210
UPMDNVXF.C005	29,000	836
IMLYNV12.C016	26,000	1,375
IMLYNV12.C005	56,000	6,680
DYTNNV11.C007	31,500	5,442
IMLYNV12.C015	38,000	2,089
DYTNNV11.C004	21,000	1,494
EMPRNV11.C004	21,500	5,093
EMPRNV11.C003	24,500	0

WHAT DOES THIS EVIDENCE EXPLAIN?

CONCLUSION #1: The Hatfield Sponsors' claim the placing surrogate points on the perimeters of CBs is a conservative approach (causing the model to overstate customer dispersion and therefore overstate required feet of plant) is completely false.

FACT: When points are placed in an (approximately) straight line, the area of the resulting polygon is miniscule and the converted rectangle with identical area distorts (understates) actual customer dispersion immensely.

CONCLUSION #2: This phenomenon has nothing to do with geocoding.

FACT: The understatement of plant does not depend on points being actual or surrogate. If a cluster is made up of 100% actual geocoded points and those points happen to be stretched out in a semi-linear fashion (i.e. along a road where geocoding places points), the same distortion will take place.

CONCLUSION #3: This also explains the significant differences in route mileage produced by the BCPM and the Hatfield Model for the same wire centers.

FACT: In many cases the BCPM estimates 10 times more distribution cable for a given wire center than the Hatfield Model does. Looking at only four clusters in the Imlay, NV wire center, we produce the same table:

Wire Center	Absolute Minimum Distance Between Cluster Points (in feet)	Total Amount of Distribution Cable Built by Hatfield Model (in feet)
4 Clusters in Imlay, NV (aggregated)	140,000	17,000